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A Comparative Study of the Speech Development of Japanese and American Children (Part Four)*

—The Beginning of the Phonemicization Process—

Sei NAKAZIMA

SUMMARY

We recorded the speech sounds of nine Japanese and three American infants in Japan and two American infants in the U.S.A., all of whom were between the ages of ten and twenty-two months. We then compared the beginning periods of the phonemicization process of the three groups.

During the first several months of the second year, the infant, through his effort to express sounds, begins to notice some kind of symbolic relationship between words and the world and he acquires one kind of learning set to use words in reference to what he wants to express.

The infant then begins to develop his phonemicization process. We think that the middle several months of the second year are the beginning period of the phonemicization process. During this period, phonemes and words uttered by the child increase in number, but even at the end of the period, phonemes are not articulated differentiatedly and words are not always used correctly. Most of the words he utters are names of objects. But by the end of this period, he begins to use some words which represent the objects' place and position and to construct a few two- or three-words-sentences. Although before this period, as a means of expression, he uses bodily expressions with or without speech sounds, during this period he begins to use speech sounds but not necessarily with bodily expression. Before this period in all sorts of situations he utters word sounds and meaningless sounds with various articulatory forms, but during this period he does this very little.

There are individual differences. In one case this period begins at the age of eighteen months, and in another case it begins at fifteen months.

We do not find significant differences among the three groups, except that the group of American infants in Japan shows slow developmental process as other bilinguals do.

1. INTRODUCTION

First, in order to clarify what we are going to say in this article, we would like to summarize our opinions which were stated in former articles (Nakazima,

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S., 1962, 1966, 1970, in press).

From about the age of one month the infant begins to utter sounds and at two months he begins to change his pitch and articulation. Then the pitch and

Table 1. Development of Speech, by S. Nakazima, and Development of Sensory-motor Adaptations, by J. Piaget.

Age	Development of Speech	Development of Sensorymotor Adaptations
Year Month		
0 : 0	1. Infants cry when they are in a state of discomfort.	1. The first stage : The use of reflex.
0 : 1	2. Development of phonatory-articulatory-auditory mechanisms during the period of babbling. 1) Infants begin to utter calm sounds when they are comfortable.	2. The second stage : The first acquired adaptations and the primary circular reactions.
0 : 2	2) Infants change the pitch and articulatory forms of these sounds.	
0 : 3		
0 : 4		3. The third stage : The secondary circular reactions and the procedures destined to make interesting sights last.
0 : 5		
0 : 6	3) Repetitive babbling.	
0 : 7		
0 : 8		4. The fourth stage : The coordination of the secondary circular reactions schemata and their application to new situations.
0 : 9	3. Reorganization of babbling phonatory-articulatory-auditory mechanisms and their application to language. 1) Development of response and evocation in simple sounds.	
0 : 10	2) Development of imitation and cognition of adult speech sounds.	
0 : 11	3) Infants begin to utter words. But they do not use these words as language. In all sorts of situations they utter word sounds and meaningless sounds with various articulatory forms.	5. The fifth stage : The tertiary circular reactions and the discovery of new means through experimentation.
1 : 0		
1 : 1		
1 : 2		
1 : 3		
1 : 4		
1 : 5	4. Development of phonemicization and symbolization of speech sounds.	6. The sixth stage : The invention of new means through mental combinations.
1 : 6	1) The beginning of the phonemicization and symbolization process.	
1 : 7		
1 : 8		
1 : 9		
1 : 10	2) Development of the phonemicization and symbolization process.	
1 : 11		
2 : 0		
2 : 1		
.		
.		
.		

articulation becomes more varied and between the ages of six and eight months the child babbles repetitively. Until he is nine months old, he utters sounds, not as a means of communication but as if playing with his phonatory-articulatory organs. We think that the infant's utterance can be considered as one kind of what J. Piaget called "Circular reactions", especially the repetitive babblings as one kind of "Secondary circular reactions" (Piaget, J., 1959). And we believe that from about the age of nine months the infant begins to reorganize his babbling phonatory-articulatory-auditory mechanisms and apply them to language. At about nine months he begins to develop the ability to call to others and to respond to them with simple sounds; at about ten months he begins to be able to imitate and understand adult speech sounds; and at about twelve months he begins to use words. But he does not use these words as language. In all sorts of situations he utters word sounds and meaningless sounds with various articulatory forms. We think that during the first several months of the second year, the infant, through these efforts of expression in sounds, begins to notice some kind of symbolic relationship between words and the world and that he acquires one kind of learning set to use words in reference to what he wants to express. Thus he ends his reorganization process of babbling phonatory-articulatory-auditory mechanisms at the level of language and begins his phonemicization process. (Refer to Table 1)

In this article we would like to clarify the developmental process of the beginning period of the phonemicization process, that is during the middle several months of the second year. We describe how the infant's sounds begin to be organized into a phoneme system of language, how he begins to use his sounds as a symbol, what kind of relationship exists between the phonemicization, symbolization process and the developmental processes of other bodily, mental functions, and what kind of environmental factors have influence upon these processes.

II. PROCEDURES

There were fourteen subjects, nine of whom were Japanese and five were Americans. As shown in Table 2, they were four female and five male Japanese, and one female and two male Americans who were living in Kyoto, and one female and one male American who were living in the U.S.A. We recorded on tape the speech sounds of each subject and those of his parents in the home and described the situations in which the child spoke and behaved. Each recording took about half an hour. We used two kinds of tape recorder: TEAC (TD 102, AR 11) for the subjects in Japan, and SONY EM-1 for the subjects in the U.S.A. The overall recording and reproducing characteristic of the former was from 40 Hz to 15000 Hz ± 3 db, that of the latter from 100 Hz to 7000 Hz ± 5 db, speed 7 1/2 inch/second. We analysed these speech sounds on a soundspectrograph.

Table 2. Subjects and Recording Conditions.

Nationality	Place where S's voices were recorded	Subjects (Sex)	Beginning of recording by tape recorder	One recording per
Japanese	Kyoto, Japan	E.T. (f)	28 days (0 : 0, 28)	1 wk.
		Ya.N. (f)	1 mo. (0 : 1)	2 wks.
		Y.S. (f)	2 mos. (0 : 2)	2 wks.
		N.O. (f)	6 mos. (0 : 6)	2 wks.
		H.K. (m)	1 mo. (0 : 1)	2 wks.
		T.Y. (m)	1 mo. (0 : 1)	2 wks.
		T.T. (m)	7 mos. (0 : 7)	2 wks.
		T.U. (m)	12 mos. (1 : 0)	2 wks.
		Yu.N. (m)	13 mos. (1 : 1)	2 wks.
American	Kyoto, Japan	F.P. (f)	6 mos. (0 : 6)	2 wks.
		C.W. (m)	6 mos. (0 : 6)	2 wks.
		E.D. (m)	7 mos. (0 : 7)	2 wks.
American	Champaign, Illinois U.S.A.	M.O. (f)	16 mos. (1 : 4)	2 wks.
		C.C. (m)	6 mos. (0 : 6)	2 wks.

III. RESULTS AND DISCUSSION

In order to save space we present two cases in Table 3, 4 and Fig. 1-6.

Our hypothesis is that the middle several months of the second year are the beginning period of the phonemicization process and the four points, described below, are the characteristic features of this period.

1. During this period speech-sounds-units, uttered by the infants, increased in number, but even at the end of this period these units were not articulated differentiatedly. We would like to define speech-sounds-units as vowels, diphthongs, single consonants and affricates.

At the beginning of this period the infants tried to utter speech sounds spontaneously and in imitation, but they did not articulate these sounds correctly. Therefore, at first the number of speech-sounds-units, they tried to imitate, increased. Then there was increase in number of speech-sounds-units, they articulated spontaneously and correctly at least once (See Fig. 1, 2, 4, 5).

At the end of this period, when they imitated their parents' speech sounds, they articulated vowels, plosives and nasals, in one- or two-syllable-words, fairly well, but when they uttered them spontaneously, they did not articulate these sounds differentiatedly.

There are five vowels in the Japanese phoneme system, but more than five in the English phoneme system. Therefore it is more difficult to articulate vowels differentiatedly for an American infant than for a Japanese.

Refer to Table 3 and 4.

English /u/, /u/ and /w/ should be articulated with round lips, but Japanese

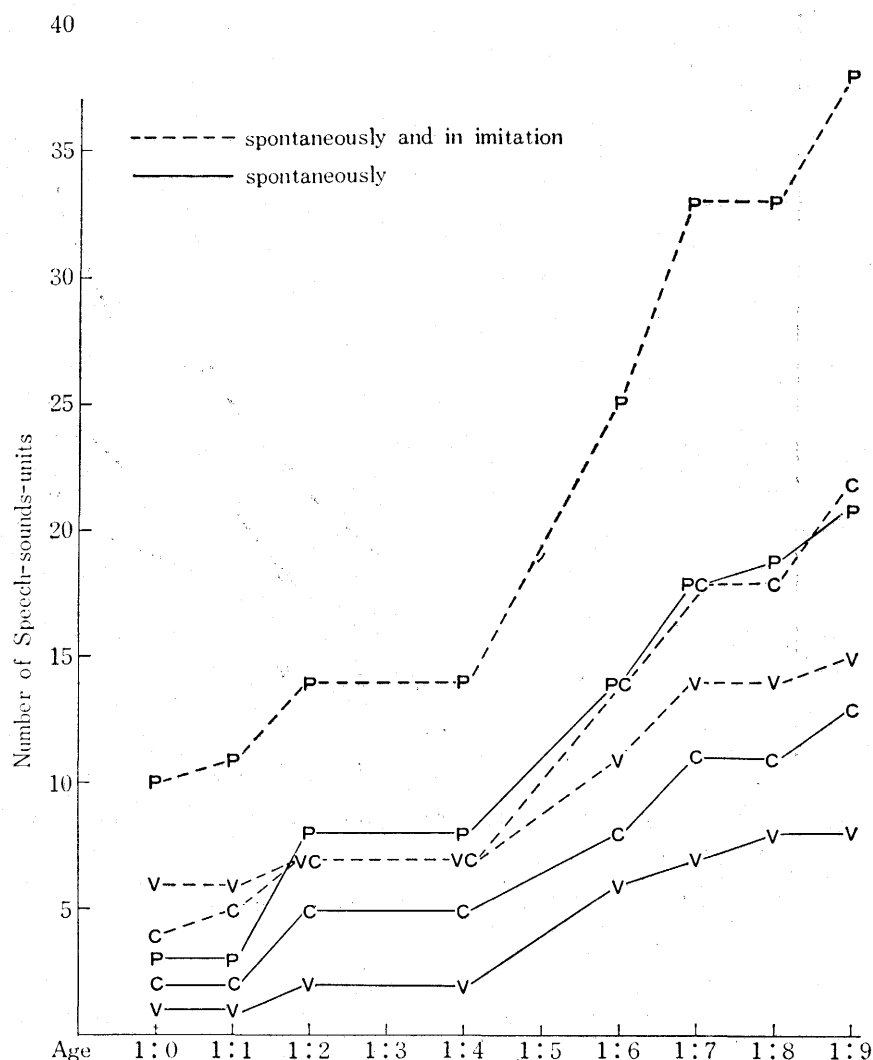


Fig. 1. Number of Speech-sounds-units, F.P. (American female) tried to articulate.

Speech-sounds-units : P : V and C

V : Vowels and Diphthongs C : Single Consonants and Affricates

/u/ and /w/ are articulated without round lips (Nakazima, S., 1959). During this period the American infants articulated both /u/ and /u/ as [u], the same as the Japanese /u/, and /w/ as [w], the same as the Japanese /w/. At the end of this period some American infants sometimes articulated /u/ and /u/ correctly.

At the end of this period, the American infants did not distinguish in articulation between /i/ and /ɪ/, /ɔ/ and /ou/, but they sometimes distinguished between /ei/ and /ɛ/, /a/ and /æ/.

In the Japanese phoneme system, some vowels should be distinguished in length, e.g. /meme/ means "Eye" and /me:me:/ means "Goat or sheep". The Japanese infants confused them even at the end of this period. They confused

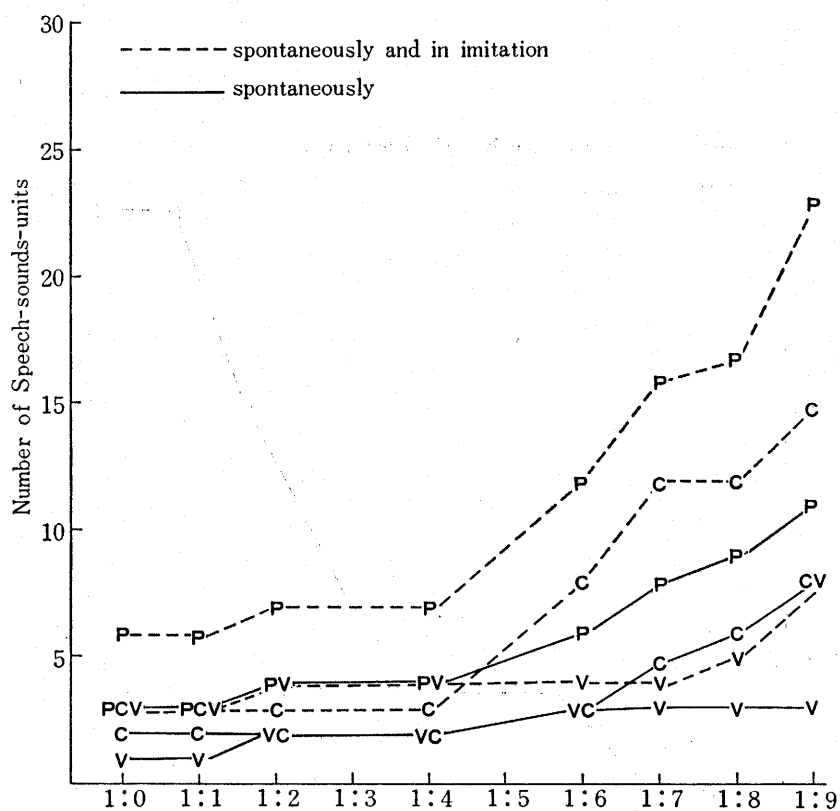


Fig. 2. Number of Speech-sounds-units, F.P. (American female) articulated correctly at least once.

Speech-sounds-units : P : V and C

V : Vowels and Diphthongs C : Single Consonants and Affricates.

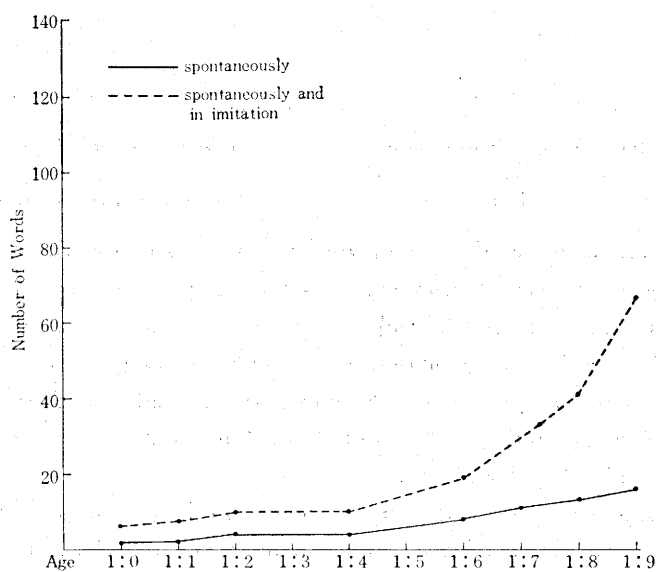


Fig. 3. Number of Words, F.P. (American female) uttered.

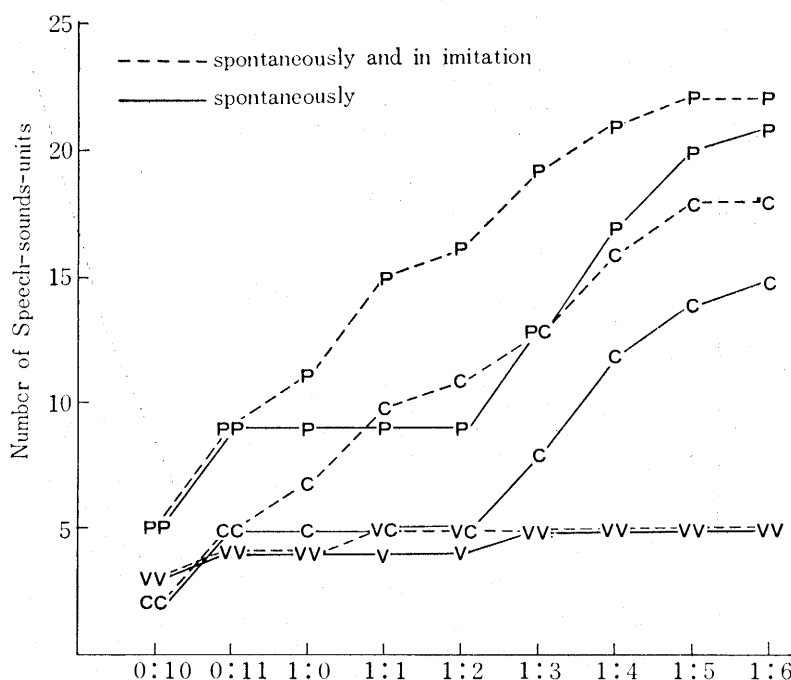


Fig. 4. Number of Speech-sounds-units, Ya.N. (Japanese female) tried to articulate.
Speech-sounds-units : P : V and C
V : Vowels C : Single Consonants and Affricates

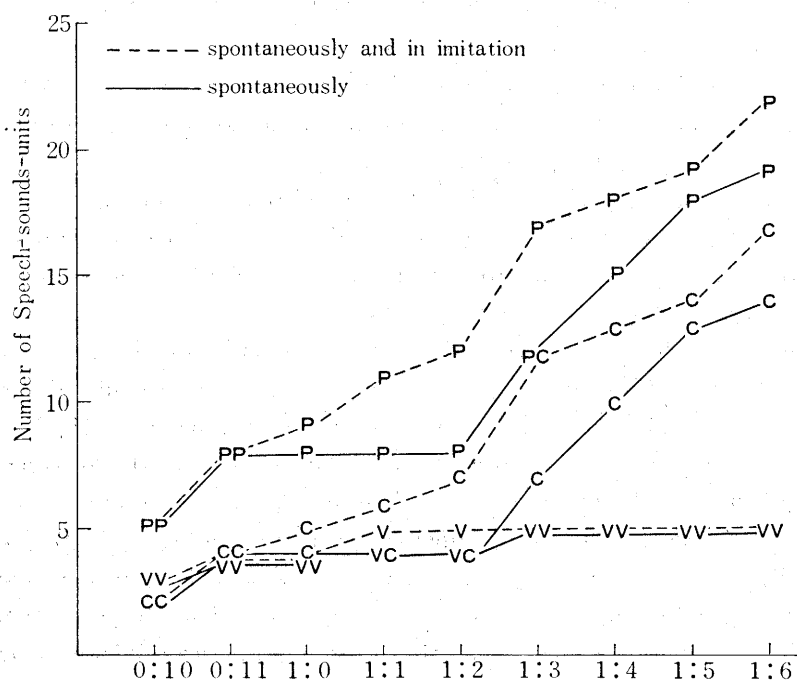


Fig. 5. Number of Speech-sounds-units, Ya.N. (Japanese female) articulated correctly at least once.
Speech-sounds-units : P : V and C
V : Vowels C : Single Consonants and Affricates

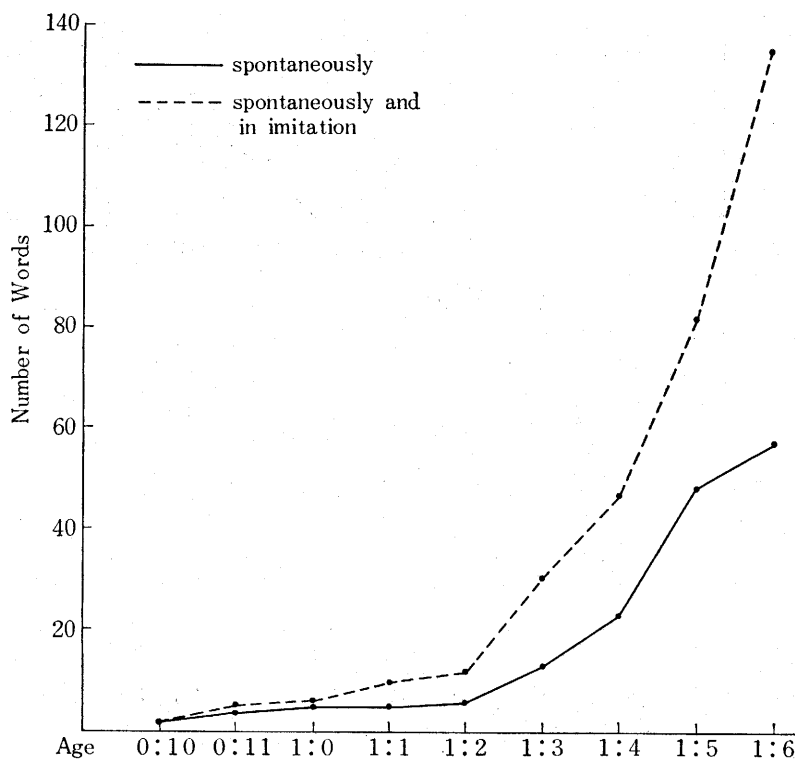


Fig. 6. Number of Words, Ya.N. (Japanese female) uttered.

/kokko/(hen or cock) and /koko/(here), too.

Some American infants, who lived in Kyoto, articulated some words in the same way as Japanese do, e.g. both some American and Japanese infants articulated "Cookey" as [kukki] identically.

At the end of this period, the infants imitated plosives and nasals fairly well, but when they uttered sounds spontaneously, they did not articulate these differentiatedly, e.g. one American articulated "Baby" as [bepe], one Japanese confused /kaki/(persimmon) and /kagi/(key), etc.

Consonants other than plosives and nasals, especially fricatives, were difficult to articulate for the infants. English /r/[ɹ] was sometimes articulated correctly, sometimes replaced by [w] or [j], sometimes omitted. Japanese /r/[ɾ] was sometimes articulated correctly, sometimes replaced by [d], or by [ɹ], the same as the English /r/, or by [l], the same as the English /l/, and sometimes omitted.

English /ʃ/ and /ʒ/ should be articulated with protruding lips, but Japanese [ɕ], an allophone of /s/, and [ʑ], an allophone of /z/, are articulated without protruding lips (Nakazima, 1959). When the American infants began to articulate /ʃ/ fricatively, they articulated it as [ɕ], e.g. some American infants articulated "Shoe" as [ɕu]. They also articulated /tʃ/ as [tɕ], the same as the Japanese [tɕ], an allophone of /ts/, and /dʒ/ as [dʑ], the same as the Japanese [dʑ], an allophone of /z/.

English /f/ was sometimes articulated correctly, and sometimes replaced by [Φ], the same as the Japanese [Φ], an allophone of /h/, e.g. one American articulated "Foot" sometimes correctly, sometimes as [Φu].

2. During this period, words uttered by the infants increased in number, but even at the end of this period words were not always used correctly. (See Table 3, 4 and Fig. 3, 6)

At the beginning of this period, they used much baby-talk. Then the amount of baby-talk decreased and the number of adult words increased. In Japan there are many baby-words, most of which are onomatopoeias, e.g. /ga:ga:/ (duck), etc. Therefore most of the words uttered by the Japanese infants at the beginning of this period were baby-words. In the case of the American female, shown in Table 3, the mother did not use as much baby-talk with her as with her siblings when they were her age. She uttered only a few baby-words.

At the end of this period, the infants uttered many words, but they did not always use these words correctly, e.g. one American infant uttered "Eye" pointing at her mouth, etc.

3. During this period, most of the words the infants uttered were names of objects. By the end of this period, they began to use some words which represented the place and position of the objects and to construct a few two- or three-words-sentences. (See Table 3, 4)

From the beginning through this period, most of the words they uttered were names of objects, e.g. mama, dada, bow wow, shoe, foot, etc. But by the end of this period, they began to use words which represented the place and position of the objects, e.g. the American infants' there, here, etc., the Japanese infants' [gofogofɔ] (lying down), [atɰci] (there), [kotɰci] (here), etc.

After they began to use these words which represented the place and position of the objects, they uttered the words, which represented the name of the objects, not always to express the name of the objects but sometimes they used these words in somewhat different ways. For example, one Japanese infant answered [to:ɰan] (father) to her mother's question "Whose is this hat?". She was supposed to say "Father's". She was not able to change the form of the word to the possessive case but she modified the function of the word.

When they began to use the words which represented the place and position of the objects, they began to construct a few two- or three-words-sentences using these words. At first they constructed sentences with their parents. For example, one American infant answered [t̥üə] to her mother's question "Where is dada?" and then responded to the mother's "Boy?" saying [t̥ə]. [t̥üə] and [t̥ə] were variations of "There". She and her mother constructed a sentence "Boy there", which meant "The boy(brother) is there". Then they began to construct sentences by themselves. For example, one Japanese infant, pointing at a tea cup filled with tea, uttered [kə ɰəɰɰɰɰ], which meant "This is tea".

[kə] was a variation of [kɔfɛ] (this), and [tɕəɪtɕəɪtɕə] was a variation of [tɕəɪtɕə] (tea).

Two other characteristic features, different from those of the preceding age level, were as follows, 4.1 and 4.2.

4.1 Although before this period, as a means of expression, the infants used bodily expressions with or without speech sounds, during this period, they began to use speech sounds but not necessarily with bodily expression. (See Table 3, 4)

Before this period, one American infant, when she wanted to express her positive feelings, shook her head up and down without saying "Yes", when she wanted to express her negative feelings, she shook it from side to side without saying "No". At the beginning of this period, she shook her head from side to side sometimes saying "No". At the end of this period, she shook her head from side to side almost always saying "No", and shook it up and down sometimes saying "Yeah".

One Japanese infant, before this period, put her hands on her head uttering [botɕi] sounds (hat or cap), when she wanted to be taken out for a walk. She had liked when her mother took her for a walk with her hat on her head. At the beginning of this period, she did not utter [botɕi] sounds. At the middle of this period, she uttered [boɕi] sounds as a name of a hat or a cap without any reference to her need to be taken out. [boɕi] is the adult pronunciation of [botɕi], which is baby-talk.

4.2 Although before this period in all sorts of situations the infants uttered word sounds and meaningless sounds with various articulatory forms, during this period they did this very little.

Before this period, the infants picked up a few of their parents' sounds, both meaningful and meaningless, and in all sorts of situations they uttered these sounds with various articulatory forms trying to use them as a means of expressing what they wanted to say. We consider this kind of utterance as one of Piaget's "Tertiary circular reactions" (Nakazima, 1970).

One Japanese infant, when she began to utter words at the age of ten months, uttered [əkəɪtɕə]-like sounds. These sounds were similar to [okəɪtɕə] sounds (mother). She uttered these sounds frequently with various articulatory forms, with or without reference to her mother. At eleven months, she uttered [əkəɪtɕə]-like sounds less frequently and [kəɪtɕə]-like ones frequently. The latter were similar to [kotɕo] sounds (to scratch with fingers). She uttered these sounds with various articulatory forms, and with or without scratching. At twelve months, she uttered [kəɪtɕə]-like sounds less frequently and [kette]-like ones frequently. The latter were similar to [akete] sounds (please open). She uttered these sounds with various articulatory forms while asking her mother to turn over the page of a picture book, or to open the door, or to do something. At thirteen months, she uttered [ɲanne]-like sounds frequently. We are not sure what word was

the origin of the sounds. She uttered these sounds mostly pointing at a picture of some thing as if asking its name, but she uttered the same sounds in other situations. But after fifteen months, i.e. during this period, she uttered [kette]-like sounds and [ganne]-like ones only a few times. (See Table 4)

Next, we would like to consider some factors which accelerate or disturb the phonemicization process.

During this period, the infants began to walk more freely than before. The enlargement of their life space made their experience more rich. The enrichment of their experience accelerated the differentiation process of their cognition of the external world. The differentiation of their cognition underlay the increase of the number of words they uttered. The mother's effort to enrich the infants' experience was also important.

O.H. Mowrer states that loving care combined with vocalization is very important (Mowrer, O.H., 1950). The infants, when they were comfortable, uttered speech sounds spontaneously or in imitation. Loving care by their parents, especially by their mothers, was one of the basic factors which made them comfortable. As stated, both speech-sounds-units, i.e. phonemes, diphthongs and affricates, and words which they tried to imitate increased in number rapidly during this period. The parent, especially the mother talking to the child was one of the basic factors which accelerated the phonemicization process.

By the end of this period, as stated, the number of words they uttered and that of speech-sounds-units they articulated correctly at least once increased. The influence of the parents' language upon their phonemicization process was observed more clearly than upon their reorganization process of babbling articulation mechanisms, which had occurred just before this period. The parents' phoneme system and word system began to work as one of the factors which determined the phonemicization and symbolization process.

As for the characteristic features of this period, described above, we did not find significant differences among the three groups, i.e. the Japanese and the American infants in Japan and the American infants in the U.S.A. But the group of American infants in Japan showed slower developmental process than the other two. They were bilinguals and had to learn two languages. For example, one American infant, at the end of this period, imitated a Japanese word /me/[me] (eye), uttered by her mother, with the same articulatory form as the Japanese, and she waved her hand to her mother's "Bye-bye" and bowed to a Japanese maid's "Sayonara (bye-bye)" as Japanese do.

There were great individual differences among the infants. For example, this period began at the age of eighteen months in the case of an American infant in Japan, and at the age of fifteen months in the case of a Japanese infant. In the former case, even at the age of twenty-one months the American infant imitated only one word "Foot" correctly in a right situation, and this she did only

once. As for the Japanese infant, at the age of seventeen months she uttered /miehen/(can not see), /wanwan e/(__ is a bow wow), and /kirin jawa/(__ is a giraffe). /miehen/ and /e/ are examples of the Kyoto dialect. In Japan males and females express themselves differently and /jawa/ is an example of female expression. /jawa/ or /e/ is placed at the end of a sentence. Their function is similar to a copula in English. (See Table 3 and 4)

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(Aug. 31, 1972, received)

Table 3. Speech Development of F.P., an American female.

S : subject M : mother F : father

Age	Development of Articulation				Development of Speech		
	Unit of Speech Sounds* ¹	Words	Sounds articulated by S* ²				
			spontaneously	in imitation			
1 : 0	/i/	baby		[ivjaɪva:] [və:]	S patted her hands each other responding to M's "Patty-cake". S uttered /dada/ to her brother and to M. S uttered /mama/ to M.		
		rounding round- ing		[dɪnaʊva:]			
	/ei/	baby		[ivjaɪva:] [və:]			
	/æ/	that		[zæ:]			
	/a/	dada	[dadæ] [dædæ]	[nanaã] [dæ] [de]			
			[dædæ]				
		mama	[mæmmæm] [mmə]	[mam] [ŋamŋ:]			
	/ʊ/	book		[bu]			
	/au/	rounding round- ing		[dɪnaʊva:]			
	/b/	book		[bu]			
		baby		[ivjaɪva:] [və:]			
	/m/	mama	[mæmmæm] [mmə]	[mam] [ŋamŋ:]			
			[ŋæ:]				
	/d/	dada	[dadæ]	[dæ] [nanaã]			
		rounding round- ing		[dɪnaʊva:]			
1 : 1	/ð/	that		[zæ:]	S responded correctly to M's "Come here", "Kiss me", "Give the book to mama", etc. /dada/ and /mama/ were not differentiated in articulation.		
	/i/	what's it		[dʒi]			
	/a/	mama		[vava] [daɪɪa]			
				[dæva] [jæjæ]			
		dada		[dæ:]			
	/ʊ/	book		[u:]			
	/au/	bow wow		[u:]			
	/b/	book		[m:] [u:]			
	/m/	mama		[vava] [dæva]			
				[daɪɪa] [jæjæ]			
	/d/	dada		[dæ:] [zæ:]			
	/ts/	what's it		[dʒi]			
	1 : 2	/ɛ/	there	[dɛæ] [deə] [dæ:]			M tried to teach /tata/ (thank you). S gave a book to M saying [ada]. S uttered there-sounds sometimes correctly, sometimes in place of tata. S shock her head up and down instead of saying "Yes," and from side
				[da:]			
		/æ/	look at the book			[əmbu]	
/a/		mama	[mma]				
		tata (thank you)	[ada]				
		dada		[da]			
/ʊ/		book		[bu]			
/b/		book		[bu]			
/m/		mama	[mma]				

*1 Vowels and diphthongs, and single consonants and affricates.

*2 We described here only examples which show different articulations in regard to the unit of speech sounds.

	/t/	tata	[ada]		to side instead of "No,"
	/d/	dada		[da]	almost correctly.
	/ð/	there	[dæ]		When M waved her
	/r/	there	[deə] [deə] [dæ]		hand saying "Bye-bye",
1 : 4	/a/	dada		[na:]	S waved her hand.
	/u/	book		[bu:] [bu]	S waved her hand to
	/b/	book		[bu:]	M's "Bye-bye".
	/d/	dada		[na:]	A Japanese maid
1 : 6	/i/	milk	[mi:]	[mi:]	bowed saying "Sayonara
	/ei/	pritty		[pu:]	(bye-bye)". S bowed.
	/e/	baby		[bæ]	When S wanted to ex-
		there	[da] [tə] [tū]	[deə]	press her negative feel-
		chair		[teə] [teə]	ing, S shook her head
	/a/	dada		[da] [da]	from side to side with
	/ɔ/	more	[mo] [mə]		or without saying "No",
	/ʌ/	come		[kə] [ka]	when positive, S shook
	/ou/	no	[now] [nɔw] [nəu]		it up and down, without
		go		[gou]	saying "Yes", almost
	/u/	book	[bu] [bu:] [bæ]	[bu] [bu:] [bæ] [ba:]	correctly.
	/u/	shoe		[ʃu:]	M "Where is dada?"
	/p/	pretty		[pu:]	S [tū] pointing at F.
	/b/	baby		[bæ]	M "Boy?" S [tə]. M
		book	[bu]	[bu]	"There, yeah." M and
	/m/	milk	[mi:]	[mi:]	S seemed to construct
		more	[mo]		a sentence : "(The) boy
	/t/	pretty		[pu:]	(is) there."
	/d/	dada		[da]	
		drink		[dri:]	
	/n/	no	[now] [nɔw]		
	/k/	come		[kə]	
	/g/	go		[gou]	
	/l/	milk	[mi:]	[mi:]	
	/ð/	there	[da] [tū]	[deə]	
	/r/	there	[tū] [tə]	[deə]	
		chair		[teə]	
		more	[mə]		
	/ʃ/	shoe		[ʃm:] [ʃu:] [u:]	
	/tʃ/	chair		[teə]	
1 : 7	/e/	there	[deə] [da:] [dæ]	[deə] [da]	S did not utter tata-
		bear		[beə] [bæ]	sounds.
		chair		[dettə] [dæ]	S uttered there-sounds
		get up		[geə]	sometimes correctly, i.e.
	/a/	mama		[mə]	to M's "Where is your
		dada		[da]	shoes?", sometimes in
		what	[hwa]		place of tata, i.e. when
		yeah	[jə]		S gave a book to M,

	Johnny (brother's name)		[da]	sometimes in place of yeah, i.e. to M's "Can you say baby?", some- times playing alone without any communi- cation functions.
/a/	box		[bə]	
/ə/	dog		[də]	
/ʌ/	duck		[də] [da]	
	get up		[gəə]	
/u/	Ruth (sister's name)		[ɹu] [wə]	S uttered yeah-sounds sometimes correctly, sometimes in place of there, i.e. to M's "Where is baby?"
	cute		[kə:]	
/ə/	purse		[pə]	
	girl	[gə:]	[gə]	
/ai/	bye-bye		[bə]	
/au/	flower		[Φwaʊ] [fla]	When S wanted to express 'no', S shook her head from side to side almost saying "No", sometimes without "No", when to express 'yes', shook it up and down almost without saying "Yes", sometimes with "Yeah", almost correctly.
/ɔi/	boy		[bə]	
/p/	purse		[pə]	
/b/	bye-bye		[bə]	
	box		[bə]	
	boy		[bə]	
/m/	mama		[mə]	
/d/	dada		[da]	
	dog		[də]	
	duck		[də]	
/k/	cute		[kə:]	
/g/	get up		[gəə]	
	girl	[gə:]	[gə]	
/l/	flower		[fla] [Φwaʊ]	
/w/	what	[hwa]		
	flower		[Φwaʊ]	
/j/	yeah	[jə]		
/f/	flower		[fla] [Φwaʊ]	
/ð/	there	[dəə] [təə]	[dəə]	
/r/	Ruth		[ɹu] [wə]	
	there	[dəə] [dɛə] [da:] [dɔ:]	[dəə]	
	chair		[dɛttə] [də]	
	bear		[bɛə]	
/tʃ/	chair		[dɛttə]	
/dʒ/	Johnny		[da]	
1 : 8 /ɪ/	Timy (brother's name)		[tɪ]	S uttered there-sounds with various articula- tory forms and in various situations, i.e. [dʒe] to M's "Where is baby?", [dɛə] to M's "Mama kiss baby.", [təə] to M's "What's that?", [tʊə] to M's "Say bunny.", etc.
	"Ti", yeah		[tɪjə]	
	kiss		[kɪ]	
	kitty		[kɪçɪ]	
	baby	[be:be]		
	cookey		[tʊe]	
	what is this		[tɪ]	
	what is that		[tʃa]	
/ei/	baby	[be:be]		

	Faith (S's name)		[Φeɪ]		S uttered [mapaisaw- ci]-like sounds to M's
/ɛ/	there	[dɛə][deə][dütə][twe]	[tɛə]		"You say mama." The
	dress		[dwe]		sounds seems to construct
/a/	yeah	[ja:] [ja]			two-words-sentence.
	dada		[da]		S waved her hand
	"Ti", yeah		[tɪjə]		saying "Bye-bye" to M's
/æ/	what is that		[tja]		"Bye-bye", and S bowed
/ʊ/	cookey		[twe]		silently to Japanese
/u/	Ruth		[ɹu] [ɹw]		maid's "Sayonara (bye- bye)".
/ai/	bye-bye	[ba:baɪ]			
/b/	baby	[be:bɛ]			
	bye-bye	[ba:baɪ]			
/t/	Timy		[ti]		
	"Ti", yeah		[tɪjə]		
	kitty		[kɪçɪ]		
	what is this		[ti]		
	what is that		[tja]		
/d/	dada		[da]		
	dress		[dwe]		
/k/	kiss		[kɪ]		
	kitty		[kɪçɪ]		
	cookey		[twe] [tw]		
/j/	yeah	[ja:]			
	"Ti", yeah		[tɪjə]		
/f/	Faith		[Φeɪ]		
/ð/	there	[dɛə] [twe] [dʒe]	[tɛə]		
/r/	Ruth		[ɹu] [ɹw]		
	dress		[dwe]		
	there	[dɛə] [twe]			
1 : 9 /i/	ear		[tɪjw]		S named everything to
	tree		[tʁi] [tɹi]		eat and drink as "milk".
	Sweep		[wɪpɪ] [pɪə]		S did not utter there-
/ɪ/	milk		[mɪə] [mə]		sounds.
	Timy		[tim]		
	here	[çɪə] [hwa]			
	twinkle		[tɪŋkə]		
	cookey	[kwɪkɪ]	[kwɪkɪ]		Japanese pronounce
	baby	[be:bɪ] [bepe]	[be:bɪ]		cookey as [kwɪkɪ].
/ei/	baby	[be:bɪ]	[be:bɪ]		S imitated M saying
	cake		[keɪ]		a Japanese word /me/
	plane		[pə]		[me] (eye) correctly.
/ɛ/	pencil		[pɛjɪpɛjɪ]		
	bed		[bɛ]		
	bear		[bɛ]		
	chair		[tʃɛə]		
	bread		[brɛ]		
/æ/	apple		[bæpɹw]		

	pants		[pə]	
	bag		[bə]	
	banana		[bnæ]	
	dady		[dæ]	
	can		[kjə]	
	thank you		[tɪŋkw]	
	branch		[brə]	
	cracker	[kwə]	[kwə]	
/a/	dolly		[da]	
	darling		[də]	
	car		[ka:]	
	Johny		[dʒə] [dʒə]	
	stocking		[sta]	
/ɔ/	more		[mo]	
	water		[wə]	
/ʌ/	button		[bə]	
	bufallo		[bə]	
	brush		[brə]	
/ou/	no		[no]	
	nose		[now] [no] [du]	
/ʊ/	book		[bʊ] [bə]	
	cookey		[kwɪki]	
	cuckoo		[kʊkw]	
	foot		[fʊt] [Φw]	
/u/	Ruth		[ɹu] [ɹw]	
	room		[ɹw]	
	shoe		[ʃw]	
	shooting		[ʃɔw]	
	school		[kʃw]	
	cuckoo		[kʊkw]	
	thank you		[tɪŋkw]	
/ai/	eye		[aɪ]	
	bye-bye		[baɪbaɪ] [bə]	
/au/	mouth		[bo]	
/ɔi/	boy		[boɪ]	
/p/	pencil		[pjɪpɪ]	
	pants		[pə]	
	plane		[pə]	
	apple		[bæpw]	
	Sweepee		[wɪpi]	
/b/	baby	[beɪ] [bepe]	[be:ɪ]	
	bear		[bə]	
	bed		[bə]	
	bag		[bə]	
	boy		[boɪ]	
	bufallo		[bə]	
	button		[bə]	
	book		[bʊ]	

S uttered [fʊt] pointing at her foot. This is only one case S articulated and used correctly.

S uttered [aɪ] pointing at her mouth.

	banana	[bnæ]
	bye-bye	[barbar] [bə]
	branch	[bʁə]
	bread	[bræ]
	brush	[brʁə]
/m/	milk	[mɪə]
	more	[mo]
	mouth	[bo]
	Timy	[tɪm] [tɪ]
/t/	Timy	[tɪm]
	twinkle	[tɪŋkə]
	tree	[tri]
	stocking	[sta]
	foot	[fʊt] [Φʊ]
/d/	dolly	[da]
	darling	[dɑ]
/n/	no	[no]
	nose	[now] [dʁ]
	banana	[bnæ]
/k/	cake	[keɪ]
	can	[kɔ]
	car	[ka:]
	cookey	[kʉkki]
	cuckoo	[kʉkʉ]
	cracker	[kʁə]
	school	[kju]
	twinkle	[tɪŋkə]
	thank you	[tɪŋkʉ]
/ŋ/	twinkle	[tɪŋkə]
	thank you	[tɪŋkʉ]
/l/	milk	[mɪə]
	twinkle	[tɪŋkə]
	apple	[bæpʉ]
/w/	water	[wə] [mə]
	twinkle	[tɪŋkə]
	Sweepee	[wi:pi]
/f/	foot	[fʊt] [Φʊ]
/θ/	thank you	[tɪŋkʉ]
/s/	stocking	[sta]
/r/	Ruth	[ɹʉ]
	room	[ɹʉ]
	branch	[bʁə]
	bread	[bræ]
	brush	[brʁə]
	tree	[tri] [tʃi]
	cracker	[kʁə]
	car	[ka:]
	chair	[tʃɛə]

/s/	here	[çɪə] [hʉə]	
	shoe		[çw]
	shooting		[tçw]
/h/	here	[çɪə] [hʉə]	
/tʃ/	chair		[tçɛə]
/dʒ/	Johny		[dʒa]

M did not use as much baby-talk with S as with S's siblings when they were S's age.

We could not get S's data when S was eleven, fifteen, and seventeen months of age and after twenty-two months of age. When S was ten months of age, S uttered only meaningless sounds.

Table 4. Speech Development of Ya.N., a Japanese female.

S : subject M : mother F : father

Age	Development of Articulation				Development of Speech
	Unit of Speech Sounds*1	Words (meaning)	Sounds articulated by S*2		
			spontaneously	in imitation	
0 : 9					M asked S "Where is /kokko/(hen or cock)?" S looked for it in the garden.
0 : 10	/i/*3 [i]*4	/hai/ (response to calling name)	[haijə] [hai]	[haijə] [hai]	S uttered /kokko/ looking at a hen and at a canary.
	/a/	[hai]*5	[hai] [ə:ijə]	[hai]	S uttered [a:ijə ə:de a:ijə a:ijə] to M's calling.
	/o/	/kokko/+ (hen or cock)	[koko]		It seems to be one of variations which show developing process from repetitive babblings to multi-words sentences.
	/k/	[kokko]*	[koko]		S uttered [əkətɕə]-like sounds frequently. These sounds are similar to [oka:tɕan] (mother). S uttered these sounds not only to M, but also to F, and even when S was alone without any references to M.
	/h/	[hai]	[hai] [a:ɪ]	[hai]	

M asked S "Where is /kokko/(hen or cock)?" S looked for it in the garden.

S uttered /kokko/ looking at a hen and at a canary.

S uttered [aɪjə ə:de aɪjə a:jə] to M's calling. It seems to be one of variations which show developing process from repetitive babblings to multi-words sentences.

S uttered [əkətçə]-like sounds frequently. These sounds are similar to [oka:tçan] (mother). S uttered these sounds not only to M, but also to F, and even when S was alone without any references to M.

*1 Vowels and single consonants and affricates.

*2 We described here only examples which show different articulations in regard to the unit of speech sounds.

*3 Phonemical descriptions.

*4 Phonetical transcriptions. Hereafter we omit phonetical transcriptions which are the same as the phonemical descriptions.

*5 We omit phonemical descriptions from the second.

+ These are Japanese baby-words, most of them are onomatopoeias.

0 : 11	/i/	[hai] /botsji/ (hat or cap) [boʔci]⁺	[ai]			<p>S uttered [kokkoko kə]. Conventionally /kokko ka/ means "Is it a hen (cock)?" We are not sure whether S asked or not.</p> <p>S uttered [əkəʔcə]-like sounds less frequently and [kəʔcə]-like ones frequently. The latter sounds are similar to [koʔcə] (to scratch with fingers). S uttered these sounds scratching with her fingers on the floor, F's foot, etc., and without scratching.</p>
	/e/	/kore/ (this) [kofe]	[poʔci] [biʔcə]	[boʔci]		
	/a/	/ka:tsjan/ (mother) [ka:ʔcən]	[koe]		[koʔcə]	
	/o/	[hai] [boʔci]⁺	[ai] [poʔci] [piʔcə] [petcə]		[boʔci] [bəʔci]	
		[kokko]⁺ [kofe]	[koko] [kəkə] [koe] [kəje]	[kokko] [kaka] [kəkə]		
	/b/	[boʔci]⁺	[biʔcə] [poʔci]	[boʔci]		
	/k/	[kokko]⁺	[kəkə] [koko]	[kokko] [kaka] [kokkoko]		
		[kofe]	[koe]			
	/r//f/	/kore/ [kofe]	[koje] [koe]			
	/h/	[hai]	[ai]			
	/ts/[ʈʂ]	[boʔci]⁺ [ka:ʔcən]	[poʔci]		[koʔcə]	
1 : 0	/i/	[boʔci]⁺ [hai]	[poʔci] [hai]		[boʔci] [pottə] [boʔci]	<p>S uttered [kəʔcə]-like sounds less frequently and [kette]-like ones frequently. The latter sounds are similar to [akete] (please open). S uttered these sounds mostly when S wanted to ask someone to turn over the page of a book in order to find pictures of hens or cocks.</p> <p>S uttered /kokko/ looking at birds, dogs, horses, etc.</p> <p>S uttered [koko wa]. Conventionally /kokko wa/ means "Where is a hen (cock)?" We are not sure really S asked or not.</p> <p>S uttered [kette]-like sounds asking M or F to turn over the page, to open the door, or to do something.</p>
	/a/	[ka:ʔcən] /wanwan/ (bow wow) [wanwan]⁺	[kəʔce:]		[waãwaã] [mæmmæ] [wowo]	
		[hai]	[hai]			
	/o/	[boʔci]⁺ [kokko]⁺	[poʔci] [kokko]		[boʔci] [kəkə]	
	/b/	[boʔci]⁺	[poʔci]		[boʔci] [pottə]	
	/k/	[kokko]⁺	[kokko] [koko] [kokoko] [gokko] [koxo] [xokko]	[kəkə]		
		[ka:ʔcən] [wanwan]⁺	[kəʔce:]		[waãwaã] [mæmmæ] [waãwaã] [mæmmæ]	
	/w/[w]	[wanwan]⁺				
	/h/	[hai]	[hai]			
	/ts/[ʈʂ]	[boʔci]⁺ [ka:ʔcən]	[poʔci] [kəʔce:]		[boʔci] [pottə]	
1 : 1	/e/	[kofe]	[kəje]			
	/a/	[ka:ʔcən] [wanwan]⁺ /kjakka/⁺ (monkey)	[kəʔcə]		[wanjə] [ʎa:ʎa:]	

1 : 2	/o/	/poppo/* (dove)		[o:]	S uttered frequently
		/mo:/* (cow or ox)		[mmō]	[ɣanne]-like sounds
		[kokko]*		[koko] [kəkkə]	pointing at a picture of
		[kofe]	[kōje]		something. S seemed to
	/u/[w]	/bu:bu:/ (pig)			be asking "What is this?"
		[bu:bu:]*		[u:u:] [əbuə] [u:]	S uttered [kəʔʔə kōje].
	/p/	[poppo]*		[o:]	S might said "Mama,
	/b/	[bu:bu:]*		[əbuə] [gu:] [u:u:]	what is this?"
	/m/	[mo:]*		[mmō]	
	/k/	[ka:ʔʔan]	[kəʔʔə]		
		[kokko]*		[kəkkə] [koko] [gəkə]	
				[ɣəʔʔə]	
		[kofe]	[kōje]		
		[kjakkja]*		[ɣa:ɣa:]	
	/n/	[wanwan]*		[wanjə]	
	/r/[ʃ]	[kofe]	[kōje]		
	/w/[w]	[wanwan]*		[wanjə]	
	/j/	[kjakkja]*		[ɣa:ɣa:]	
	/ts/[ʧ]	[ka:ʔʔan]	[kəʔʔə]		
	/i/	[boʔʔi]*		[o:ʔʔə]	S uttered /kokko/
	/a/	[wanwan]*		[wa:ā] [wāwa]	almost in regard to hens
1 : 3		/njannjan/* (kitty)		[jəjə]	or cocks.
		[kjakkja]*		[kəkə] [gakax] [æ]	S named everything to
		/tsjatsja/ (tea)			eat and drink as [ʧəʔʔə].
		[ʧəʔʔə]*	[ʧəʔʔə]* ⁶		S pointed at a picture
	/o/	[boʔʔi]*		[o:ʔʔə]	of a sleeping girl and
		[kokko]*		[ke] [kü]	uttered [ɣanne]-like
	/u/[w]	[bu:bu:]*		[buə]	sounds asking M to sing
	/b/	[bu:bu:]*		[buə]	a lullaby.
	/n/	[njannjan]*		[jəjə]	
	/k/	[kokko]*		[kü]	
		[kjakkja]*		[kəkə] [gakax] [æ]	
	/n/	[wanwan]*		[wa:ā] [wāwa]	
		[njannjan]*		[jəjə]	
	/w/[w]	[wanwan]*		[wa:ā] [wāwa] [wa:]	
	/j/	[njannjan]*		[jəjə]	
		[kjakkja]*		[kəkə] [gakax] [æ]	
	/ts/[ʧ]	[ʧəʔʔə]*	[ʧəʔʔə]		
		[boʔʔi]*		[o:ʔʔə]	
	/i/	/pijopiyo/* (chicken)		[pijopi] [po:jə]	S uttered [kette]-like
		/mimi/ (ear)		[pijopila]	sounds less frequently.
				[mime]	Instead of these, S uttered
					[koʔʔi] (here or this

*6 In the Japanese phoneme system, [a] and [ə] are considered to be single vowel /a/.

/e/	/hihin/* (horse) [çiçin]		[i]	one) and [at̚çi] (there or that one). S uttered both sounds asking M or F to turn over the page, to tell the other animal's name, etc., undifferentiatedly. S uttered [ɲanne]-like sounds less frequently. M asked S "Which is your eye?" S uttered [ɲanne]-like sounds pointing at her eye. S uttered [kə t̚çət̚çə-t̚çə] (This is tea). S uttered [koe wa] (What is this?). M said to S "Go to bed soon." S pretended to be sleeping uttering [gu:gu:~], [gu:gu:] is a onomatopoeia showing snoring.
	/kottsji/ (here or this one) [kot̚çi]	[kot̚çi]		
	/attsji/ (there or that one) [at̚çi]	[ət̚çi] [ət̚çɛ]		
	/meme/* (eye)		[meme]	
	/me:me:/* (goat or sheep)	[me:mme:] [me:me]	[meme] [mma]	
	/tete/* (hand)		[tete]	
	[kofe]	[kue] [kuə] [kə]		
	/atsu/ (hot) [atsü]		[a:t̚çw]	
	[at̚çi]	[ət̚çi]		
	/anjo/* (foot)		[aãjo]	
/a/	/mamma/* (food)		[mamma] [memme]	
	/ga:ga:/* (duck)		[ga:ga:]	
	[wanwan]*	[wanwan]	[waãwaã]	
	[t̚çat̚çə]*	[ət̚çət̚çə]		
	[njannjan]*		[nja:n] [njaŋgæ]	
	[kjak̚ja]*		[kɪkək] [gək̚jə] [kəkə]	
	/botan/ (button)		[boja] [bojə]	
	[botan]		[boja]	
	[mo:]*		[mmo] [mma]	
	[kokko]*	[koko]	[kokko] [kəkə]	
/o/	[kofe]	[goe] [kuə] [kə]		
	[kot̚çi]	[kot̚çi] [kət̚çi]		
	/gorogoro/ (lying down) [gofogofō]		[googoo]	
	/tsjo:tsjo/ (butterfly) [t̚ço:t̚ço]	[t̚çət̚çə] [t̚jot̚jo] [t̚jw̥t̚jw̥]	[t̚w̥t̚w̥] [d̚zət̚ə] [t̚çə]	
	[pijopi]jo]		[pijopi] [po:jə]	
			[pijopila]	
			[b̥w̥w̥w̥:] [b̥w̥b̥w̥w̥]	
/u/[w]	[b̥w̥w̥w̥:]*	[w̥w̥w̥w̥:]		
	/kutsu/ (shoe) [kw̥ts̥s̥ü]* ⁷		[kw̥ts̥s̥ü]	
	/gu:gu:/ (sound of snoring) [gw̥:gw̥:]	[gw̥w̥gw̥]		

*7 In the Japanese phoneme system, [w] and [ü] are considered to be single vowel /u/.

	/tsju:tsju:/ (rat or mouth) [tɕu:tɕu:] ⁺		[tɕu:jw]	
	[atsü]		[a:tɕu]	
/p/	[pijopi]o] ⁺		[pijopi] [pijopila]	
			[po:ja]	
/b/	[botan]		[boja]	
	[bu:bu:] ⁺	[u:bu:] [u:u:]	[bubw] [bu:u:]	
			[u:βu:] [u:u:]	
/m/	[mimi]		[mime]	
	[meme] ⁺		[meme]	
	[me:me:] ⁺	[me:me][me:mme:]	[meme] [mma]	
	/mamma/ ⁺ (food)		[mamma][mmemme]	
	[mo:] ⁺		[mmo:]	
/t/	[tete] ⁺		[tete] [tɕetɕe]	
	[botan]		[boja]	
/n/	[njannjan] ⁺		[nja:n] [njanggæ]	
/k/	[kokko] ⁺		[kokko] [kəkə]	
	[ko:tɕi]	[ko:tɕi] [go:tɕi]		
	[kutsü]		[kutsü]	
	[kjakkja] ⁺		[kəkə] [kɪkak] [gakjə]	
/g/	[ga:ga:] ⁺		[ga:ga:] [a:ga:]	
	[gofogofu]		[googoo]	
	[gu:gu:]	[gu:gu]		
/N/	[anjo] ⁺		[aãjo]	
	[njannjan] ⁺		[nja:n] [njanggæ]	
	[wanwan] ⁺	[wanwan] [waãwaã]	[banwan] [waãwaã]	
			[wauwau]	
	[çiçin] ⁺		[i]	
/r/[ɾ]	[kofe]	[goe]		
	[gofogofu]		[googoo]	
/w/[w]	[wanwan] ⁺	[wanwan]	[waãwaã] [banwan]	
	/wa/* ⁸ [wa]	[wa]		
/j/	[pijopi]o] ⁺		[pijopi] [pijopila]	
	[anjo] ⁺		[aãjo]	
	[njannjan] ⁺		[nja:n] [njanggæ]	
	[kjakkja] ⁺		[kɪkak] [gakjə]	
/h/[ç]	[çiçin] ⁺		[i]	
/ts/[ts]	[atsü]		[a:tɕu]	
	[kutsü]		[kutsü]	
	[tɕa]	[ɔtɕatɕa]		
	[tɕo:tɕo]	[tɕatɕa] [tjotjo]	[tɕa] [ɕzətə] [tütütü]	
	[tɕu:tɕu:] ⁺		[tɕu:jw] [jw:jw]	
	[atɕi]	[ɔtɕi] [ɔɕze]		
	[ko:tɕi]	[ko:tɕi] [kəɕzi]		
1 : 4	/i/		[bɪəpəi]	S uttered [ɣanne]-like
	[mimi]		[mi:mi] [memi]	sounds little and [kəwa]-
			[mëmë]	like ones frequently.

*8 /wa/ follows a noun in a sentence and shows that the noun is a nominative case.

	/nir:tsjan/ (elder brother)	[nir:tsjan]	[tɕi:r:tã]	
	[çiqin]⁺	[çir:] [iqi]	[iqi]	
	/aita/ (ouch)		[aija:]	
	/hasi/ (chopstick)			
	[haçi]	[azi]	[haɕi]	
	[atɕi]	[atɕi]		
	[kotɕi]	[kəɕi] [kəɕi]		
	/kuzi/ (nine o'clock)			
	[kudzi]		[kudzi] [kudzü]	
	/bambi/⁺ (deer)		[məmbr:]	
	/sensei/ (teacher)		[ɕeje:] [tɕeje:]	
/e/	[me:me:]⁺	[me:me:] [meme]		
	[tete]⁺		[date] [tetje]	
	[kofe]	[koe] [koə]		
	[sensei]		[ɕeje:]	
/a/	[aita]		[aija:]	
	[atsü]		[adzu]	
	[anjo]⁺		[aãjo]	
	[atɕi]	[atɕi]		
	/pan/ (sound of explosion)	[pã]		
	[bambi]⁺		[məmbr:]	
	[kar:tsjan]		[kar:tsjan]	
	[ga:ga:]⁺	[ga:ga:] [gaga]		
	/gakko/ (school)		[gakko]	
	[wa]	[wə]		
	[wanwan]⁺	[wanwan] [uwa]	[wa]	
	[haçi]	[azi]	[haɕi]	
	[njannjan]⁺	[njan] [njən]		
	[kjakkja]⁺	[gake] [kɪ:ke]	[kjəke] [gəke]	
	[tɕatɕa]⁺	[tɕatɕa]	[tɕatɕa]	
	/obatsjan/ (aunt)			
	[obatɕan]		[bətɕaã] [ba:bə]	
	/to:tsjan/ (father)			
	[to:tsjan]		[təɕaã]	
/o/	[poppo]⁺		[bopo]	
	[mo:]⁺	[mmo] [mmo:]	[mo:] [mma]	
	[to:tsjan]		[tɕotaã] [təɕaã]	
	/dondon/ (sound of drum)		[djodjən]	
	[kokko]⁺	[kokko] [kəkkə]		
	[kofe]	[koe] [gwe]		
	[kotɕi]	[kotɕi] [kəɕi]		

The latter sounds seemed to be /kore wa/ (What is this?).

S uttered [tɕi:r:tã pã] (Brother, shot the toy gun).

F said "Elefant". S responded [googoo]. F and S seemed to construct a sentence "An elefant is lying down".

	/koŋkon/+ (fox)		[kō]
	[gofogofō]	[googoo]	
	/zo:/ (elefant)		
	[dzo:]		[dō]
	[t̥ɕo:t̥ɕo]	[tjotjo] [d̥zot̥ɕa]	
	[gakko:]		[gakko]
	[anjo]+		[aãjo]
	[pijopi jo]+		[biepəi]
/u/[w]	[bu:bu:]+	[bambu:]	
	[kuutsū]	[kuɰt̥ɕu] [gud̥z̥ɕ]	[kuutsū] [gurt̥ɕi:]
	[kud̥zi]		[kud̥zi]
	[gu:gu:]		[gugə] [bu:βu:]
	[t̥ɕu:t̥ɕu:]+		[t̥ɕuɰt̥ɕu]
	/tsjuntsjun/ (sparrow)		
	[t̥ɕuɰnt̥ɕuɰ]+	[d̥zuɰt̥ɕə]	[tjɰt̥ju]
/p/	[pijopi jo]+		[biepəi]
	[poppo]+		[bopo] [bobo] [βoβo]
/b/	[bambi]+		[mambi]
	[bu:bu:]+	[bambu:]	
	[obaɰɕan]		[bəɰt̥ɕə]
/m/	[mimi]		[mi:mi] [pemɪ]
	[me:me:]+	[me:me:]	
	[mo:]+	[mmo]	[mo:] [mma]
/t/	[tete]+		[date] [tetje]
	[to:t̥ɕan]		[təɰt̥ɕə] [tjojan]
			[t̥ɕotaã]
	[aita]		[aija:]
/d/	[dondon]		[djodjon] [jojon]
/n/	[njannjan]+	[njan]	
/k/	[ka:t̥ɕan]		[ka:t̥ɕan] [ga:jan]
	[kokko]+	[kokko] [goko]	
	[koɰt̥ɕi]	[koɰt̥ɕi] [gəɰt̥ɕi]	
	[kofe]	[koe] [gwe]	
	[koŋkon]+		[kō]
	[kuutsū]	[kuɰt̥ɕu] [gud̥z̥ɕu]	[kuutsū] [gurt̥ɕi:]
	[kud̥zi]		[kud̥zi]
	[kjakkja]+	[gake] [kɪ:ke]	[kjake] [gəke]
	[gakko:]		[gakko]
/g/	[ga:ga:]+	[ga:ga:]	
	[gakko:]		[gakko]
	[gofogofō]	[googooo]	
	[gu:gu:]		[gugə] [bu:βu:]
			[bu:u:]
/N/	[anjo]+		[ai] [aãjo]
	[obaɰɕan]		[bəɰt̥ɕə]
	[to:t̥ɕan]		[təɰt̥ɕə] [t̥ɕotaã]
			[tjojan]

		[ka:ɬɕan]		[ka:ɬɕan]
		[nɔjannɔjan] ⁺	[nɔjan] [nɔjam] [nɔjaã]	
		[wanwan] ⁺	[wanwan] [uɔwa]	
		[ɕiɕin] ⁺	[ɕi]	[iɕi]
		[dondon]		[dɔdɔɔn]
		[koŋkon] ⁺		[kō]
/r/[f]		[kofe]	[koe]	
		[gofogofɔ]	[googoo]	
/w/[w]		[wanwan] ⁺	[wanwan] [uɔwa]	[wa]
		[wa]	[wə]	
/j/		[anjo] ⁺		[aã] [aijo]
		[pijopiɔjo] ⁺		[biɔpɔi]
		[nɔjannɔjan] ⁺	[nɔjan]	
		[kɔkɔkɔja] ⁺	[gake] [kɔ:ke]	[kɔkɔkɔ] [gɔke]
/s/* ⁹ [s]		[sensei]		[ɕeɕe:] [tɕeɕe:]
		[ɕ]	[aɕi]	[haɬɕi]
/z/* ¹⁰ [dz]		[dzɔ:]		[do]
		[ɬɕ]	[kɔdɕi]	[kɔdɕi] [kɔzi]
				[kɔdzɔ]
/h/[h]		[haɕi]	[aɕi]	[haɬɕi]
		[ɕ]	[iɕi] [ɕi:] [i:]	[iɕi]
/ts/[ts]		[atsɔ]		[aɬɕɔ]
		[ɬɕ]	[tɕatɕa] [dɕatɕa]	[tɕatɕa] [tɕadɕa]
		[tɕɔ:tɕɔ]	[tɔtɔjɔ] [dɔtɔtɕɔ]	
		[tɕɔ:tɕɔ:tɕɔ] ⁺		[tɕɔ:tɕɔ]
		[tɕɔ:tɕɔ:tɕɔ] ⁺	[dɕɔ:tɕɔ]	[tɕɔ:tɕɔ]
		[kɔtɕi]	[kɔtɕi]	
		[atɕi]	[atɕi] [adɕi]	
		[obaɬɕan]		[bɔtɕɔ] [ba:bɔ]
		[to:tɕan]		[tɔtɕaɔ] [tɕɔtaã]
				[tɔjojan]
1 : 5	/i/	[ka:ɬɕan]		[ka:ɬɕan] [ka:jan]
		/i:ja/	[i:ja:]	[i:ja]
		(no)		
		[pijopiɔjo] ⁺	[bɔnbɔɔ] [bepɔ]	[bɔnbɔ] [piɔepi]
			[bebe]	
		/miehen/		[m:ɕiɔn] [miɕe]
		(can not see)		
		[ni:tɕan]		[tɕi:tan]
		/ningjo:/		[giɔgɔjɔ]
		(doll)		
		/kirin/		
		(giraffe)		
		[kiɔin]	[kɔiɔn] [tiɔdi] [tɕiɔn]	
		/kingjo/		[ɔiɔn]
		(goldfish)		
		/ringo/		
		(apple)		
		[fiɔgo]		[ninnjo]

S said /kirin jawa/ (This is a giraffe). /jawa/ is one of female's expressions. In Japan female's expressions are somewhat different from male's.

S said /miehen/ and /wanwan e/. These expressions are examples of the Kyoto dialect.

/jawa/ or /e/ is placed at the end of a sentence. Their function is similar

*9 In the Japanese phoneme system, [s] and [ɕ] are considered to be single consonant /s/.

*10 In the Japanese phoneme system, [z] ([dz]) and [ɬ] ([ɬz]) are considered to be single consonant /z/.

/e/	/risu/ (squirrel)	[tɪjə]			to a copula in English. M asked S "Whose is this hat?" pointing at F's hat. S answered [to:ʔɕan] (father). It means "Father's". S uttered /kore wa/-like sounds less frequently.
	[fɪsɪ̃]	[ɕɪɪ] [ɕɪɪ] [ɪɕɪ]			
	[ɕiɕin]+				
	[aita]			[ata:]	
	/ozitsjan/ (uncle)				
	[odʒiʔɕan]	[dʒi:ʔɕan]		[ʔɕitan]	
	/wani/ (crocodile)				
	[wani]	[woɪ:] [a:ni]			
	/peggin/ (penguin)			[mɛɪ]	
	[bambi]+	[ma:me]		[mammi]	
	/raion/ (lion)				
	[ʔaion]	[ja:jo]			
	[haɕi]	[haʔɕi]			
	/boisi/ (hat or cop)				
	[bo:ɕi]			[bo:ʔi]	
	[kudʒi]			[kudʒi]	
	/tokci/ (clock)	[ge:ko:]			
	[sensei]			[ʔɕeɛjeɪ]	
	/e/	[je]			
	[peggin]			[mɛɪ]	
	[meme]+			[meme]	
	[me:me:]+	[me:][meime][meme]		[me:me:]	
	[tete]+	[dete]		[tite]	
	/densja/ (street car)				
/a/	[denɕa]			[de:tan]	
	/nenne/+ (sleeping)			[nen je]	
	[sensei]			[ʔɕeɛjeɪ]	
	[miehen]			[mɪ:ɕuN] [mɪɕe]	
	[kofe]	[guə]			
	/a/				
	[aita]			[ata:] [əta:]	
	[anjo]+	[anjo]		[aɪjo] [ojo]	
	[bambi]+	[ma:me]		[maãbi]	
	/kaba/ (hippopotamus)	[gaba:] [baba]			
	[ka:ʔɕan]			[ka:ʔɕan]	
	[ga:ga:]+	[ga:ga:] [gaga:]			
		[go:ga:]			
	[gakkō]			[ga:ko:]	
	[ʔaion]	[ja:jo]			
	[wani]	[woɪ:] [a:ni]			
	[wanwan]+	[wanwan] [wa:wa:N]			
	/jawa/	[jawə]			
	[haɕi]	[haʔɕi]			
	/hato/ (dove)	[ha:to]			

	/za:za:/ (sound of rain) [dza:dza:]		[ɖza:ja]
	[tɕa:tɕa:] ⁺	[tɕa:tɕa] [de:tɕa]	
	[njan:njan] ⁺	[njan:njan]	
	[kjak:kja] ⁺	[ku:kikie] [kikkɪ]	
		[kjekje] [kja]	
	[oba:tɕan]	[ba:tan]	[batan]
	[botan]		[bətən][botjan][botan]
	/tora/ (tiger) [tofa]	[tɕo]	
	[ija]	[i:ja:]	[i:ja]
	[to:tɕan]	[to:tjan]	[to:tɕan] [to:tɕə]
	[ni:tɕan]		[tɕi:tan]
	[oɖzi:tɕan]	[ɖzi:tɕan]	[tɕitan]
	[deŋɕa]		[de:tan]
/o/	[poppo] ⁺	[poppo][pobu][pabo]	
	[botan]		[botjan] [bətən]
	[bo:ɕi]		[bo:zi]
	[mo:] ⁺	[mbuon] [məmmo]	
		[bom]	
	[tokei]	[geko:]	
	[tofa]	[tɕo]	
	[kokko] ⁺	[koko]	[gokko]
	/koko/ (here)	[kə]	
	[kofe]	[gwa]	
	[gofogofə]		[godogodo]
	[dzo:]	[to:] [to]	[do:]
	[tɕo:tɕo]	[tjotjo] [toto]	
	[pijopi:jo] ⁺	[buɪbuɪ][bepe:] [bebe]	[buɪpi] [pijəpi]
	[anjo] ⁺	[anjo]	[a:jo] [ojo]
	[gakkə:]		[ga:kə:]
	[niŋgjo:]		[gɪndo] [gɪŋgjo]
	[faion]	[ja:jo]	
	[kiŋgjo]		[ɲɪn]
	[fiŋgo]		[ninnjo]
	[hato]	[ha:to]	
/u/[w]	[bu:bu:] ⁺	[bu:bu:] [βu:βu:]	
		[bobo:]	
	[kwtsü]	[kwtsü] [gwdzo]	[kwtsü] [kwɖzu]
		[tju]	
	[kwɖzi]		[kwɖzi]
	[fisü]	[ti:jo]	
	[tɕu:tɕu:] ⁺	[tju:tju]	[tju:tju]
/p/	[pijopi:jo] ⁺	[bunbuɪ] [bepe:]	[buɪbi] [pijəpi]
	[peŋgin]		[mɛi]
	[poppo] ⁺	[poppo] [pobu]	
/b/	[bambi] ⁺	[ma:me]	[maãmi] [mambi]

	[bo:çi]		[bozi]
	[botan]		[botjan]
	[buw:buw:] ⁺	[buw:buw:] [βu:βu:]	
	[obaɸçan]	[ba:tjan]	[batan]
	[kaba]	[gaba:] [baba:]	
/m/	[miehen]		[m:çiN] [miçe]
	[meme] ⁺		[meme]
	[me:me:] ⁺	[meime]	[me:me:]
	[mo:] ⁺	[mbuon] [məmmo]	
		[bom]	
/t/	[tete] ⁺	[dete]	[tite]
	[to:ɸçan]	[to:tjan]	[to:ɸçan] [dodzaã]
	[tokei]	[ge:ko]	
	[tofa]	[ɸço]	
	[hato]	[ha:to]	
	[botan]		[botan] [botjan]
	[aita]		[ata:]
/d/	[dença]		[detən]
/n/	[ni:ɸçan]		[ɸçi:tan]
	[ningjo:]		[gindo]
	[nenne] ⁺		[nen je]
	[njannjan] ⁺	[njannjan]	
	[wani]	[wori:] [a:ni]	
/k/	[kifin]	[kiN] [ɸçiN]	[ɸidi]
	[kingjo]		[ɸiN]
	[ka:ɸçan]		[ka:ɸçan]
	[kaba]	[gaba:] [baba:]	
	[kokko] ⁺	[koko] [goko] [koɸo] [gokko]	
		[gogo]	
	[koko]	[kə]	
	[kofe]	[gwa]	
	[kwɸzi]		[kwɸzi]
	[kwtsü]	[kwtsü] [gwdzo]	
		[tju]	
	[kjakkja] ⁺	[kɪkɪ] [kjəkjə] [kja]	
		[kwɪkɪe]	
	[gakko:]		[ga:ko:]
	[tokei]	[ge:ko:]	
/g/	[ga:ga:] ⁺	[ga:ga:]	
	[gakko]		[ga:ko:]
	[gofogofō]		[googoo]
	[peŋgin]		[mēi]
	[kingjo]		[ɸiN]
	[ningjo:]		[gindo]
	[fingo]		[ninnjo]
/N/	[anjo] ⁺	[anjo] [a:jo]	[aijo] [ojō]
	[dença]		[de:tan]
	[to:ɸçan]	[to:tjan]	[to:tan] [dodzaã]

	[ka:tʃan]		[ka:tʃan]
	[ni:tʃan]		[tʃi:tan] [tʃi:taã]
	[odʒi:tʃan]	[dʒi:tʃan]	[tʃi:tʃan] [tʃi:tʃaã]
	[oba:tʃan]	[ba:tʃan]	[batan]
	[botan]		[botʃan]
	[kifi:n]	[ki:n] [kii]	[tidi]
	[wanwan] ⁺	[wanwan] [wanwan]	
		[wanwaã] [wanwan]	
	[faion]	[ja:jo]	
	[njannjan] ⁺	[njannjan][njannjan]	
	[pengin]		[mɛi]
	[miehen]		[mɪ:ɕi:n] [mɪ:ɕe]
/r/[f]	[fiŋgo]		[ninɲjo]
	[fi:sü]	[ti:ʒə]	
	[faion]	[ja:jo]	
	[kifi:n]	[ki:n]	[tidi]
	[kofe]	[gwa]	
	[tofa]	[tʃo]	
	[gofogofə]		[godogodo][go.ɔgo.ɔo]
			[googoo]
/w/[w]	[wani]	[wɔi:] [ani:]	
	[wanwan] ⁺	[wanwan] [baba:n]	
	[jawə]	[jawə]	
/j/	[jawə]	[jawə]	
	[i:ja]	[i:ja:]	[i:ja]
	[anjo] ⁺	[anjo]	[aijo]
	[pijopi:jo] ⁺	[bunbun] [bepe:]	[pijəpi] [bunpi]
	[njannjan] ⁺	[njannjan]	
	[niŋgjo:]		[giŋgjo] [giŋdo]
	[kiŋgjo]		[ɣi:n]
	[kjakkja] ⁺	[kjəkjə] [kɪkkɪ]	
		[kuɪkɪkɪe] [kja]	
/s/[s]	[sensei]		[tʃeɛjei]
	[fi:sü]	[ti:ʒə]	
[ç]	[haçi]	[haɫçi]	
	[deŋça]		[de:tan]
	[bo:çi]		[bo:ɪ]
/z/[dz]	[dza:ɾdza:]		[dza:ja]
	[dzo:]	[to:]	[do:]
[dʒ]	[odʒi:tʃan]	[dʒi:tʃan]	[tʃi:tʃan]
	[kuɔdʒi]		[kuɔdʒi]
/h/[h]	[hato]	[ha:to]	
	[haçi]	[haɫçi]	
	[miehen]		[mɪ:ɕi:n] [mɪ:ɕe]
[ç]	[çi:çin] ⁺	[çi:] [ɪçi]	
/ts/[ts]	[kuɪtsü]	[kuɪtsü] [gudzo]	[kuɪtsü] [kuɪtʃu]
		[tjɪ]	[kuɔdʒu]
[tʃ]	[tʃatʃa] ⁺	[tʃatʃa] [deɫça]	

1 : 6	/i/	[t̚co:t̚co]	[tjotjo] [toto]	
		[t̚cu:t̚cu:] ⁺	[tjwɪtjw]	[tjwɪtjw]
		[to:t̚can]	[to:tjan]	[to:t̚can] [dod̚zaã]
		[ka:t̚can]		[ka:t̚can] [ka:tan]
		[ni:t̚can]		[t̚ci:tan]
		[od̚zi:t̚can]	[d̚zi:t̚can] [d̚zi:tan]	[t̚ci:t̚caã] [t̚ci:tan]
		[oba:t̚can]	[bartjan] [bartan]	[batan]
		[ija]		[ija]
		[pijopi]o] ⁺	[nippe] [peppe]	
		[mimi]		[mimi]
		[miehen]		[mieçen] [meçeçen]
		[ni:t̚can]		[ni:t̚can]
		[nig̚jo:]		[nig̚jo]
		[kifiŋ]	[kii] [ki]	[kiŋ] [kiŋ]
		[kiŋjo]		[kig̚jo]
		[fiŋgo]		[ninŋjo]
		[fiŋu]		[fiçwɪt̚cu]
		[çiçin] ⁺	[çiçi]	
		/himo/ (string)		[imo]
		[çimo]		
		/zi:tsjan/ (grand father)		
		[d̚zi:t̚can]		[d̚zi:tan]
		[aita]		[aɪt̚ca:]
		[faion]	[jajo] [t̚cawo]	[daidjon] [jaijo] [jajo]
		/semi/ (cicada)		[pemi]
		/kani/ (crab)		[kani]
		[wani]	[wanni] [ani]	[wani]
		/kaki/ (persimmon)		[kaki]
		/ke:ki/ (cake)		[ke:ki] [k̚e:ki]
		/kugi/ (nail)		
		[kwgi]		[kwgi] [kwiz]
		/kagi/ (key)		[kagi]
		/tsju:rippo/ (tulip)		
		[t̚cu:ɪppw]		[bippw]
		/mari/ (ball)		
		[mafi]		[mai]
		[haçi]		[ati]
		[bo:çi]		[bo:çi] [bo:t̚ci]
		/ahiru/ (duck)		
		[açiɸw]	[aki] [aɪ]	[açi] [aɪjo] [aai]
		[od̚zi:t̚can]		[ditan]
		[kw̚d̚zi]		[kw̚d̚zi]
		[tokei]	[te]	[tokei]

S uttered [koe kuoo: t̚ciçi]. [koe]/kore/ means "This". [kuoo:] /goro- goro/ means "Lying down". [t̚ciçi] is one of variations of /siteru/, which means "Is". S told a three-words-sentence.

/e/	[bambi] ⁺	[mammi]	[mami]
	[pengin]		[pemmi]
	[sensei]		[tɕieɕtɕie] [teja]
	[pengin]		[pemmi]
	[meme] ⁺		[meme]
	[me:mei] ⁺	[me:mei] [memme]	
		[me:me]	
	[tete] ⁺	[tjetje]	
	[dença]	[derta]	[jeɕtɕa][derta][tɕɕa]
	[nenne] ⁺		[njeɕnɕe] [njannjan]
	/neko/ (cat)		[njeke]
	[ke:ki]		[ke:ki] [ke:ki]
	[sensei]		[tɕieɕtɕie] [teja]
	[semi]		[pemi]
	[miehen]		[mieɕen] [meɕeɕen]
	/kame/ (tortoise)		[kame]
	[tokei]	[te]	[tokci]
	[kofe]	[koe]	[koe]
	/suzume/ (sparrow)		
	[súdzúme]		[uɕwe]
/a/	[anjo] ⁺	[anjo]	[aɿjo]
	[açifw]	[aki]	[aɕi] [aai]
	[aita]		[aɿtɕa:]
	[atsüü]		[aɿtɕu:]
	/pan/ (bread)		[poō]
	[bambi] ⁺	[mammi]	[mami]
	/baɿtsjan/ (grand mother)		
	[ba:tɕan]		[baɿtɕã]
	/basu/ (bus)		
	[basüü]		[baɿtɕu]
	[mafi]		[mai]
	[ka:tɕan]	[ka:tɕan]	[ka:tɕan]
	[kaba]	[pəɣwa] [ba:ba]	[wəxa] [βɣa]
		[βaɣa]	
	[kani]		[kani]
	[kame]		[kame]
	[kagi]		[kagi]
	[kaki]		[kaki]
	[ga:ga:] ⁺	[ga:ga:]	
	[gakko:]		[gakko]
	[faion]	[ja jo]	[daidjon]
	/rakuka/ (camel)		
	[fakuda]		[datokuzwa]
	[wanwan] ⁺	[wanwan] [wazwa]	
	[wani]	[wanni] [ani]	[wani]

/o/	/saru/ (monkey)		
	[saɸu]		[ɸɕajɸu]
	[dza:dza]		[da:ja:]
	[hato]	[ato]	
	[haɕi]		[ati]
	[kjakkkja]+	[kɕɕakkkjɕ] [kækjɕ]	
		[kekja]	
	[njannjan]+	[njannjan]	
	/tsja/ (tea)		
	[ɸɕa]	[ɸɕa]	
	[obaɸɕan]		[batjan] [oba:tan]
	/uma/ (horse)		
	[uma]	[m:ma]	[uma] [ummā]
	[botan]	[botjan]	[botan] [boɸɕā]
	[tofa]	[powa] [po:ɸza]	[toa]
	[ija]		[ija]
	[to:ɸɕan]		[to:ɸɕan]
	[ni:ɸɕan]		[ni:ɸɕan]
	[oɸziɸɕan]		[ditan]
	[denɕa]	[de:ta]	[jeɸɸɕa]
	[obaɸɕan]		[oba:tan] [əbatjan]
			[ba:ɸɕan]
	[oɸziɸɕan]		[ditan]
	[poppo]+	[poppo]	[poppo] [pobbo]
	[botan]	[botjan]	[botan]
	[bo:ɕi]		[bo:ɕi] [bo:ɸɕi]
	[mo:]+	[mmo:ɸ] [mmambo]	
	[to:ɸɕan]		[to:ɸɕan] [toɸɕan]
	[tofa]	[powa] [po:ɸza]	[toa]
	[tokei]	[te]	[tokei]
	[kokko]+	[kokko]	
	[koko]	[goko]	
	[kofe]	[koe] [kuɸe]	[koe]
	[gofogofɸ]	[kuoo:ɸ]	[gofogoo]
	[dzo:ɸ]	[dzo:ɸ] [to]	[do:ɸ]
	[ɸɕo:ɸɕo]	[tjo:tjo] [tjotjo]	
	[ɕimo]		[imo]
	[hato]	[ato]	
	[neko]		[njeke]
	[pijopiɸo]+	[nippe] [peppe]	
	[gakko:ɸ]		[gakko]
	[faion]	[ja:jo] [ɸɕaɸo]	[daidjon]
	[fiŋgo]		[linnjo]
	[niŋgjo:ɸ]		[niŋgjo]
	[kiŋgjo]		[kigjo]
	[anjo]+	[anjo]	[aɸjo]
	/u/[u]	[uma]	[uma]
		[m:ma]	

	[bu:bu:] ⁺	[po:po:]	
	/bu:bu:/ (car)		
	[bu:bu:] ⁺	[bu:bu:]	
	[kutsü]	[kwtçw] [kəçə]	[kwtçw]
	[kuŋi]		[kuŋi] [kwəgi]
	[kwdzi]		[kwdzi]
	[südzüme]		[uwe]
	[tçw:tçw:] ⁺	[tju:tju]	
	[tçw:fippw]		[bippw]
	[fakwda]		[datokwza]
	[fisü]		[fçw:tçw]
	[basü]		[batçw]
	[atsü]		[atçw]
	[açifw]	[aki]	[açi] [aɾjo]
/p/	[pijopi]o ⁺	[peppe] [nippe]	
	[peŋgin]		[pemmi]
	[pan]		[poð]
	[poppo] ⁺	[poppo]	[poppo] [pobbo]
	[tçw:fippw]		[bippw]
/b/	[bambi]	[mammi]	[mami]
	[ba:tçan]		[batçã]
	[basü]		[batçw] [wa:tçw]
	[botan]	[botjan]	[botan]
	[bo:çi]		[bo:çi]
	[bu:bu:] ⁺	[po:po:]	
	[bu:bu:] ⁺ (car)	[bu:bu:]	
	[oba:tçan]		[batjan]
/m/	[kaba]	[ba:ba] [pəgwə] [βaɣa]	[wəxa] [βɣa]
	[mimi]		[mimi]
	[miehen]		[mieçen] [meçeçen]
	[meme] ⁺	[meme]	
	[me:me:] ⁺	[me:me:] [memme]	
	[mafi]		[mai]
	[mo:] ⁺	[mmo:] [mmambo]	
	[semi]		[pemi]
	[kame]		[kame] [kaŋe]
	[uma]	[m:ma]	[uma] [ummã]
	[çimo]		[imo]
	[südzüme]		[uwe]
/t/	[tete] ⁺	[tjetje]	
	[to:tçan]		[to:tçan]
	[tofa]	[powa]	[toɾa]
	[tokei]	[te]	[tokei]
	[botan]	[botjan]	[botan]
	[hato]	[ato]	
	[aita]		[atça:]
/d/	[dença]	[de:ta]	[jeçtça] [de:tça]

/n/	[fakuda]		[datokuwaa]
	[ni:tʃan]		[ni:tʃan]
	[ningjo:]		[ninnjo]
	[nenne]*	[njannjan]	[njennje]
	[neko]		[njeke]
	[njannjan]*	[njannjan]	
	[wani]	[ani] [wanni]	[wani]
	[kani]		[kani] [kagi]
	[kifin]	[ki:] [tʃi]	[kiin]
	[kingjo]		[kigjo]
/k/	[ke:ki]		[ke:ki]
	[ka:tʃan]	[ka:tʃan]	[ka:tʃan]
	[kaba]	[ba:ba] [pəgwa] [βaχa]	[wəxa] [βχa]
	[kani]		[kani]
	[kame]		[kame]
	[kagi]		[kagi]
	[kaki]		[kaki] [kagi]
	[kjakkja]*	[kekja] [kækjə]	[kjəkkjə]
	[kokko]*	[kokko] [koko]	
	[koko]	[goko]	
	[kofe]	[koe]	[koe]
	[kutsüü]	[kwtʃu]	[kwtʃu]
	[kugi]		[kugi] [kwəgi]
	[kudʒi]		[kudʒi]
	[tokei]	[te]	[tokei]
	[gakko:]		[gakko]
	[neko]		[njeke]
	[fakuda]		[datokuwaa]
	[ga:ga:]*	[ga:ga:] [ka:ga:]	
	[gakko:]		[gakko]
/g/	[gofogofu]	[kuoo:]	[gofogoo]
	[kugi]		[kugi] [kui:]
	[kagi]		[kagi] [kadʒi] [kai]
	[pengin]		[pemmi]
	[figgo]		[linnjo]
	[ningjo:]		[ningjo] [ninnjo]
	[kingjo]		[kigjo] [kinnjo]
	[anjo]*	[aijo] [anjo]	[aijo]
	[denʃa]	[de:ta]	[jeētʃa] [de:ta]
	[sensei]		[tʃieētʃie] [teja]
/n/	[to:tʃan]		[to:tʃan]
	[ka:tʃan]	[ka:tʃan]	[ka:tʃan]
	[ni:tʃan]		[ni:tʃan]
	[ba:tʃan]		[batʃā]
	[dʒi:tʃan]		[dʒitan]
	[obatʃan]		[batʃan]
	[odʒitʃan]		[ditan]
	[çiçin]*	[çiçt] [tʃt]	

	[njannjan] ⁺	[njannjan][njannjan]	
	[wanwan] ⁺	[wanwan] [wa:wa]	
	[kifin]	[kii]	[kiin]
	[faion]	[ja:jo]	[daidjon] [jaijo]
	[botan]	[botjan]	[botan] [botɕã]
	[peŋgin]		[pemmi]
	[pan]		[poō]
	[miehen]		[mieçen]
/r/[ɾ]	[figgo]		[linnjo]
	[fisü]		[fiçwtɕw]
	[faion]	[ja:jo] [tɕawo]	[daidjon] [jaijo]
	[fakuda]		[datokuzwa]
	[kifin]	[kii] [tɕi]	[kiin] [kin]
	[mafi]		[mar]
	[tɕw:fippw]		[bippw]
	[kofe]	[kwe]	[koe]
	[tofa]	[powa] [po:dɕa]	[to:ɾa] [toa]
	[gofogofɔ]	[kwoo:]	[gofogoo]
	[safw]		[tadjw] [tɕajw]
	[aɕifw]	[aki]	[aɕi] [arjo]
/w/[w]	[wanwan] ⁺	[wanwan]	
	[wani]	[ani] [wanni]	[wani]
/j/	[kjakka] ⁺	[kækjə] [kekja]	[kjəkkjə]
	[njannjan] ⁺	[njannjan]	
	[ija]		[ija]
	[pijopi] ⁺	[nippe] [peppe]	
	[anjo] ⁺	[anjo]	[arjo]
	[ningjo:]		[ningjo]
	[kingjo]		[kigjo]
/s/[s]	[sensei]		[tɕreɕtɕre] [teja]
	[semi]		[pemi]
	[safw]		[tɕajw] [tadjw]
	[südzürme]		[uwe]
	[fisü]		[fiçwtɕw]
	[basür]		[batɕw]
[ɕ]	[haɕi]		[ati]
	[bo:ɕi]		[bo:ɕi][bo:ɕi] [bo:tɕi]
	[denɕa]	[de:ta]	[de:tɕa] [deta]
/z/[dz]	[dza:dza:]		[da:ja:]
	[dzo:]	[dzo:] [do:] [tɕo:]	[do:] [go:]
		[jo:] [to:]	
[ɕz]	[ɕzi:tɕan]		[ɕzi:tɕan]
	[oɕzi:tɕan]		[ditan]
	[kwɕzi]		[kwɕzi]
/h/[h]	[hato]		[ato]
	[haɕi]		[ati]
	[miehen]		[mieçen] [meçeçen]
[ɕ]	[ɕiçin] ⁺	[ɕiçi] [içi]	

	[çimo]		[imo]
	[açifw]	[aki] [ai]	[açi] [aijo] [aa]
/ts/[ts]	[kutsü]	[kutçw]	[kutçw]
	[atsü]		[atçw:]
[tç]	[tça]	[tça]	
	[tço:tço]	[tjo:tjo] [tjotjo]	
	[tçw:tçw:]+	[tju:tju] [džw:džw]	
	[tçw:fippw]		[bippw]
	[to:tçan]		[to:tçan] [tço:tjan]
	[ka:tçan]	[ka:tçan] [ka:tan]	[ka:tçan]
		[ka:jan]	
	[ni:tçan]		[ni:tçan] [nir:tan]
	[ba:tçan]		[ba:tçã]
	[oba:tçan]		[ba:tçan] [batjan]
			[ba:jan] [oba:tan]
	[dži:tçan]		[dži:tan]
	[odži:tçan]		[ditan]